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| 09/357,507 | 07/20/1999 | KIYOSHI TAGUCHI | 10059-286 | 9338 |

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AKIN GUMP STRAUSS HAUER & FELD L.L.P.
ONE COMMERCE SQUARE
2005 MARKET STREET, SUITE 2200
PHILADELPHIA, PA 19103

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| EXAMINER |
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LEUNG, JENNIFER A

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| ART UNIT | PAPER NUMBER |
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1764

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 09/357,507 | Applicant(s) TAGUCHI ET AL. | |
| | Examiner Jennifer A. Leung | Art Unit 1764 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6,8,10,21 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,8,10,21 and 23-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on November 14, 2005 has been received and carefully considered. Claims 2, 5, 7, 9, 11-20 and 22 are cancelled. Claims 1, 3, 4, 6, 8, 10, 21 and 23-28 remain active.

Response to Arguments

2. Applicant's arguments filed on November 14, 2005 have been fully considered but they are not persuasive. Beginning on page 8, last paragraph, Applicants argue,

“First of all, applicants dispute the Examiner's position that Johnson structurally meets the claims and that the particular gas is not considered an element of the apparatus... Johnson clearly does not disclose a hydrogen purifying apparatus, but rather a catalytic afterburner for exhaust gases from an internal combustion engine of an automobile. Even if the term “hydrogen purifying” in the preamble of the claim were considered only a statement of use of the apparatus, the Examiner cannot ignore this use, since it goes to the heart of the invention and gives meaning to the claims.”

The Examiner respectfully disagrees. A recitation of the intended use of the claimed invention must result in *a structural difference* between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Additionally, the recitation of “a hydrogen purifying apparatus” has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15

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(CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). In apparatus claims, expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the claim. In this case, the prior art structure of Johnson et al. is structurally capable of performing the intended operation of hydrogen purification. The hydrogen purification as described by Applicants is achieved by the oxidation of carbon monoxide contained in a reformed gas stream. Similarly, Johnson's apparatus is used for the oxidation of carbon monoxide, except that the stream being purified is emitted from an internal combustion engine. However, the particular composition of the stream to be purified has not been given patentable weight. What matters is that in both the apparatuses of Applicant and Johnson, the oxidizing ability is achieved by the structural component of a reaction segment containing a catalytic material that can selectively oxidized CO. According to Applicants' specification (page 24, last paragraph, continuing to page 25),

“... although the catalyst carrying *platinum* on an alumina carrier was mainly used for the catalyst layer, *any catalyst can be used similarly if it can selectively oxidized CO*. Applicable examples are noble metallic catalysts such as rhodium, ruthenium and composites of theses catalysts, and transition metal composite oxide catalyst having a perovskite structure.”

Johnson et al. (column 7, lines 54-63) employs similar catalysts, and specifically discloses,

“The oxidizing catalysts employed on the surfaces of the catalyst supports described herein can be a metal such as palladium, platinum, nickel, silver and the like, which are deposited on the supports in the usual way employed for depositing these catalysts on ceramic substrates.”

The catalysts employed by Johnson et al. for oxidizing carbon monoxide are equivalent to the catalysts claimed by Applicant.

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Beginning on page 9, second paragraph, Applicants argue,

“Second, Johnson does not disclose a reformed gas inlet, as presently claimed, but only an exhaust gas inlet 16 which contains hydrocarbons and other noxious products from an internal combustion engine. Similarly, Johnson does not have a reformed gas pathway, but only an exhaust gas pathway.”

Beginning on page 9, third paragraph, Applicants argue,

“Third, the Examiner has distorted the disclosure of the Johnson device by contending that the first catalyst bed 26/31 is a reformed gas pathway. In fact, the first catalyst chamber 26/31 is just the first segment on the reaction segment having a catalyst bed. At best, the top of the first catalyst chamber 26 before entering the catalyst bed 31 could be considered a gas pathway. However, this gas pathway does not partially surround the outer periphery of the second catalyst bed 28/31 through the divider plate.”

The Examiner respectfully disagrees. In the recitation of a “reformed gas inlet”, the terms “reformed gas” which modify the word “inlet” merely express an intended use of the “inlet” structure. An “inlet” is merely an opening providing a means of entrance or intake. Thus, the inlet 16 in the apparatus of Johnson *structurally* meets the claims. Similarly, in the recitation of a “reformed gas pathway”, the terms “reformed gas” which modify the word “pathway” merely express an intended use of the “pathway” structure. A “pathway” is merely a route or course along which something travels or moves. Thus, the pathway in the apparatus of Johnson, comprising the gas passages through the first catalyst bed 26/31, *structurally* meets the claim.

Beginning on page 9, fourth paragraph, Applicants argue,

“Fourth, applicants cannot find anywhere in Johnson where it is disclosed that the gas is heated by heat exchange through the divider plate 33. The only disclosure applicants can find of heating the gases in Johnson is by the oxidation by the catalyst beds 31, which is an exothermic reaction.”

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The Examiner respectfully disagrees. As disclosed in Johnson and confirmed by Applicants, exothermic reaction heat is liberated from the first catalytic stage due to the oxidation of carbon monoxide. The Examiner maintains that heat from the exothermic reaction in the pathway (i.e., the passages in the first catalytic stage **31/26**) will inherently transfer to the reaction segment (i.e., the second catalytic stage **31/28**) via the divider plate **33** that separates the two stages. As is well known in the art of heat exchange, heat will transfer through a boundary from a region of higher temperature to a region of lower temperature. Taking a reading from Table II as an example (see column 8, data for Elapsed Mileage equal to 140), it can be seen that the temperature within the pathway, prior to cooling, approaches 1,125 °F (T2, After 1st Catalytic Stage). After cooling, the temperature immediately upstream of the reaction segment is about 950 °F (T3, After 1st lower heat exchanger). The temperature within the reaction segment then approaches 885 °F (T4, After 2nd Catalytic stage). From this data, we observe that the temperature within the pathway (on the left side of partition **33**) is higher than the temperature within the reaction segment (on the right side of partition **33**). Thus, heat will inherently transfer through the partition **33** from the pathway **31/26** to the reaction segment **31/28**.

Beginning on page 11, last paragraph, Applicants argue,

“... the increased amount of catalyst which produces the “positive gradient” in Volker and the embodiment disclosed at the second paragraph of page 29 of the present application are not what is being claimed in claims 3, 4, 23 and 24. As previously claimed and as clarified in the present amendment, the difference in catalytic material is not in the amount of the catalytically active substance, but rather a difference in the activation temperature of the catalyst material for carbon monoxide.”

The Examiner respectfully disagrees and maintains that the teaching of a variation in the amount

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of catalytically active substance, according to Volker, meets the claims. In particular, it is noted that Applicant's specification (page 29, lines 6-8) specifically states,

"The part with low reactivity to CO may be formed on the catalyst layer by providing a part carrying a reduced amount of catalyst."

This is in contradiction to the argument posed by Applicants.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 6, 8, 21 and 25-28 are rejected under 35 U.S.C. 102(b) as anticipated by Johnson et al. (US 3,109,715).

Regarding claims 1 and 21, Johnson et al. (FIG. 1-3) discloses an apparatus comprising:
a reaction segment (i.e., second catalyst chamber **28**) having a catalyst bed for oxidizing carbon monoxide (i.e., counting from the left in FIG. 2, the second catalyst block **31**, wherein the catalyst is an oxidizing catalyst such as palladium, platinum, nickel, silver and the like; column 7, lines 54-63);

a gas inlet (i.e., exhaust gas inlet **16**) and a gas pathway (i.e., comprising the first catalyst chamber **26**) for supplying gas to the reaction segment **28**;

an oxidant gas supplying segment (i.e., via tube **42**, or tube **40**) for supplying an oxidant gas (i.e., supplementary air) to the gas pathway **26**;

a cooler (i.e., heat exchanger **21**, including baffle **35** and fins **38, 39**; column 4, line 63 to

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column 5, line 30) for cooling the gas in the gas pathway, in a vicinity of an upstream side of the catalyst bed **31/28**; and

means for heating a downstream side of the catalyst bed **31/28**; said means comprising a portion of the gas pathway (i.e., as defined by chamber **26**) which at least partially surrounds an outer periphery of catalyst bed **31/28**, and is separated from the catalyst bed **31/28** by a wall (i.e., divider plate **33**) so as to inherently heat the downstream side of the catalyst bed **31/28** by the gas in portion **26** before passing through the cooler **21/35/38/39** (i.e., due to heat generated during the exothermic reaction of oxidation).

Although a gas comprising a “reformed gas containing carbon monoxide in addition to a main component of hydrogen gas” is not specifically disclosed, the apparatus of Johnson et al. structurally meets the claims the particular gas is not considered an element of the apparatus.

Regarding claims 6 and 25, Johnson et al. discloses a gas flow rate control valve located on the oxidant gas supplying segment (i.e., “Speed-controlled systems can be used to *actuate valves* which permit amounts of air which insure complete combustion of the exhaust gases to flow into the catalyst chambers,” column 6, lines 19-30).

Regarding claim 8 and 26, Johnson et al. (FIG. 2) discloses the reformed gas pathway has a first direction (i.e., as illustrated, downward in the first catalyst chamber **26**) prior to passing through said cooler **21/35/38/39**, and a second direction (i.e., as illustrated, upward in the second catalyst chamber **28**) passing through said catalyst bed **31/28**, wherein the first direction and the second direction are opposing.

Regarding claims 27 and 28, the portion of the reformed gas pathway in chamber **26** inherently heats the catalyst bed **31** in chamber **28** by direct heat transfer through the wall **33**

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(i.e., due to heat generated during the exothermic reaction of oxidation).

Instant claims 1, 6, 8, 21 and 25-28 structurally read on the apparatus of Johnson et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 3, 4, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson et al. (US 3,109,715) in view of Volker et al. (US 4,118,199).

Regarding claims 3, 4, 23 and 24, as best understood, Johnson et al. discloses the catalyst bed **31/28** being supported by a metallic material (i.e., honeycomb units comprising alumina; column 6, line 70 to column 7, line 65). Johnson et al., however, is silent as to an upstream side portion of the catalyst bed **31/28** being formed of a different catalyst material than that of a downstream side portion, such that the catalyst material constituting the downstream side portion exerts an activity at a lower temperature than the catalyst material constituting the upstream side portion. Volker teaches a catalyst bed (i.e., in the case of a single monolith; column 2, lines 29-

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33) which preferably comprises different catalyst materials for an upstream side portion relative to a downstream side portion (column 3, lines 13-45), wherein the catalyst material constituting the downstream side portion exerts an activity at a lower temperature than the catalyst material constituting the upstream side portion (i.e., as characterized by the “positive gradient” of catalytically active substance that increases in amount over the length of the catalyst system, in the direction of exhaust gas flow; column 2, lines 52-68). As defined by applicant’s specification (page 29, paragraph 2), “The part with low reactivity to CO may be formed on the catalyst layer by providing a part carrying a reduced amount of catalyst.” It would have been obvious for one of ordinary skill in the art at the time the invention was made to select a catalyst material having an activity at a lower temperature for a downstream side portion of the catalyst bed relative to a catalyst material on an upstream side portion of the catalyst in the apparatus of Johnson et al., on the basis of suitability for the intended use, because such a catalyst configuration increases the useful life and effectiveness of the catalyst bed, as taught by Volker et al. (column 3, line 56 to column 4, line 15).

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson et al. (US 3,109,715).

Johnson et al. discloses another embodiment wherein, “the invention is produced by employing an annular catalyst support rather than a block shaped support as shown in the embodiments of FIGURES 1 and 5 hereof,” (see column 13, line 47 to column 14, line 22), essentially defining a reaction segment having a tube-shape with a reformed gas pathway formed around the reaction segment. Thus, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select such a configuration for the

apparatus of Johnson et al., on the basis of suitability for the intended use thereof.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

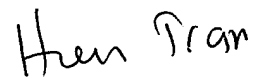
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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Jennifer A. Leung

February 5, 2006 


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PRIMARY EXAMINER